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ARINC 629 for VXI

PAC-629C-X30 Series Modules

"Ideal for aircraft LRU development, these register based devices provide maximum system throughput."

- Modules with 1 or 2 Independent ARINC 629 Channels (available in B and C size)
- 256K Bytes Dual-Port Memory for Transmit/Receive Data per Channel
- 128K bytes Simulated Personality PROM Memory per Channel
- Multiple Terminal Simulation
- Both SIM and Pseudo Bus Available Through Front Panel (Software Selectable)
- All Features of DATAC and Module are Software Controllable
- Includes Programmer's Toolbox and Device Driver Software for Ease of Programming
- On-board 40 Bit Time Stamp and Data Logging FIFO for High
- Speed Data Recording and Analysis

Description

The PAC-629 module is a single slot VXI module which provides monitor, control, test, and simulation of units which interface to ARINC 629 data buses. The B size module has a single ARINC 629 channel, while the C size module is available with a single ARINC 629 channel or two completely independent ARINC 629 channels. Both SIM and Pseudo bus connectors are available at the front panel.

The architecture of these modules is ideal for aircraft LRU development (firmware and hardware debugging), aircraft simulation, bus loading and performance analysis, software qualification testing, flight testing, and any repetitive test environment such as production, depot repair and evaluation engineering test. These modules are designed as register based devices to provide maximum system throughput. The module is available in three versions:

The **PAC-629C-X30** - Provides monitor, control, simulation, and

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to all the features of the X30 module.

The **PAC-629C-X32** - Bus Analysis module provides error injection capability, in addition to all the features of the X31 module.

Module Features

Transmit/Receive Memory

The card has 256K bytes of dual-port RAM for storing received and transmitted data. This memory is divided into 128K bytes for transmit data and 128K bytes for receive data.

The card can be programmed to perform double buffering of received and transmitted data. Double buffering of data ensures data integrity by providing a controlled manner in which the system controller and the DATAC terminal can both access data memory simultaneously. In this situation, each 128K byte buffer is divided in two, allowing the system controller to access one half (64K bytes) of the buffer while the DATAC chip simultaneously accesses the other half.

The swapping of buffers is hardware controlled so that it will not occur in the middle of a message or word string. The transmit and receive double buffering are controlled independently of one another. All DATAC transfers to dual-port memory are 16 bit (word) transfers.

Personality PROM Simulation

To allow the ARINC-629 personality to be easily reconfigured, the Personality PROM is simulated using RAM. The card has 128K bytes of dual-port RAM which is used for simulation of all three Personality PROMs (transmit, receive, and multiple). This memory allows for the downloading of one RPT, one MPT, and four XPT's.

Multiple Terminal Simulation

By utilizing the Auxiliary Extension (AXT) field of the Transmit Personality PROM (XPP), the card can simulate transmissions from multiple terminals. Each word string transmitted on the ARINC 629 bus will have the extension bits (EXT) in the Label word set to the Channel ID value as

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Time Stamping and Data Logging

For situations where it is necessary to collect data from the ARINC 629 bus for an extended period of time, the X31 and X32 versions of the card both provide time stamp and data logging FIFO capability. High speed data recording to VXI system RAM or a system disk drive can be accomplished through the 8K byte FIFO. This data logging feature allows for the collection and time stamping of all data on the bus, or alternatively the collection and time stamping of only pre-selected word strings. These models can selectively record their own transmissions as well as transmissions from other devices on the ARINC 629 bus, allowing easier correlation of bus data.

Time stamps with 1 microsecond resolution can be generated by the on-board hardware, allowing for detailed post processing and analysis of acquired data. External clock inputs allow for synchronization and control of time stamps among cards.

SIM and Pseudo Bus Front Panel Connections

The Pseudo Bus provides a less expensive, convenient data path between devices being tested. The full ARINC 629 protocol is used for Pseudo Bus, but it is not necessary to use the standard SIM and Coupler. The PAC-629 card provides front panel connections to both SIM and Pseudo Bus. Selection between SIM and Pseudo Bus can be made under program control, allowing easy switching between the two connectors.

Accessory Connector

An internal connector makes available to the user many of the DATAC and Event Timer signals (e.g., Manchester Data, DATARDY, PARITY, TXHB, STAC, BUSQ, GA, etc.).

Error Injection

Table 1 shows the errors and faults that can be injected on to the ARINC 629 bus using the X32 version of the PAC-629 card.

- Sync
- Short Word
- Bus Quiet (BUSQ)

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- Random Bus Noise
- Deaf Monitor
- Illegal Transmission
- Incorrect CRCs
- Invalid Parity
- Protocol Access Module (PAM)
- No Bus Acknowledge (NRBA, NXBA)
- Incorrect Timing Parameters (TI, TG, SG)
- Manchester bi-phase (bit and sync encoding)

Auxiliary DSP Processor

Some applications require intensive processing of the ARINC 629 data as it is being transmitted or received. Examples of this type of processing include: CRC generation and validation, data freshness counter updates, updated or stale data detection, and dynamic data transmissions. If the system controller (slot 0 controller or external controller) is relied upon for this data processing, the entire system performance may suffer. An optional 20 MIPS DSP Processor is available for the C size module which allows the module to handle even the most demanding data processing tasks, for both channels simultaneously, without risk of CPU overload.

Interrupt Generation

The robust interrupt generation capability in the PAC-629 card allows the card to asynchronously signal the host when certain events occur on the card. These include receive and transmit events, error events, buffer swap events, FIFO events, discrete I/O events, and auxiliary processor interrupts. Through program control, any of the interrupts can be selectively enabled or masked. The card can be configured to interrupt on any one of the seven VME interrupt lines.

Programmers Toolbox

The Programmer's Toolbox is a C language library of over 70 functions that is included with each PAC-629 module. These functions provide a high level programming interface to the registers on the module, thus eliminating the need for the user to write their own low level interface software.

The library supports all normal usage of the module, including: configuration, module and DATAC control, DATAC setup, DATAC Pulse Signal control, SIM control, Personality

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Additional functions are available to support the auxiliary CPU option. The software currently supports HP-VEE/HPIB, the HP/UX V382 VXI Controller, the Radisys VXI Controller, and the National Instruments VXI Controller. Please ask for information about newly available controller and operating system support.

Command Line Controller

The PAC Command Line Controller software provides low level access to most features of the PAC-629 module. This includes programming the Personality PROMS, reading and writing to card memory and registers, and monitoring the contents of the FIFO. The CLC also allows the user to ramp transmit data and monitor received data in real time.

The CLC centers around the command line interface, which uses short commands to read and write memory

and registers. Script files containing the commands may be created and executed, and log files detailing the entire session can be saved. The script file is an ASCII file that can be generated or edited by any text editing software, allowing easy creation and modification of test scenarios.

The CLC allows the user to immediately access data on the ARINC 629 bus without having to write an application program. It allows control of the terminal parameters and provides a status of the DATAC and card state. Automated repeatable tests can be written through the CLC script language to allow testing of another LRU communicating on the bus.

Library Function Calls

Configuration
InitDATAC, PseudoBus, SIMBus, TogglePseudoSIM, LoadConfig, StoreConfig

Module and DATAC Control
RunDATAC, StopDATAC, ToggleRun, SetCtrlFunc, SetHostAdr, SetAXT, SetAuxCtrl

DATAC Setup
Blockmode, IndepMode, ToggleBlkInd, EnableAltSched, DisableAltSched, ToggleAltSched, SetCID, SetXPBank, SetTiming, SetTG, SetSG, SetTI, SetTimingReg

DATAC Pulse Signal Control
SetCMDP, SetMAFS, SetMIFS

SIM Control

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Dual Port Data RAM Access and Status
FillRAM, ReadRAM, SetRAM, LoadRAM, StoreRAM

Status
DATACStatus, GetAuxStatus, GetSignature, GetCtrlFunc,
ErrorReg, LastWord, IntVec, XmitIntVec, RecvIntVec

Data Double Buffer Control
ArmRecvBufSwap, ArmXmitBufSwap, GetAuxStatus, GetTimerStatus

Timer/FIFO Control
SetTimerMask, SetTimerCmd, GetTimerStatus, ReadFIFO,
FillFlagRAM, ReadFlagRAM, SetFlagRAM, LoadFlagRAM,
StoreFlagRAM

Error Injection
SetErrCtrl, SetErrDelay, SetErrRepeat, SetErrTrig,
GetErrStatus

Utilities
WriteStatus, P629T_version

Specifications

System Requirements:

Electrical Module Power Dissipation:

Single Channel 7.5 watts

-with SIM installed 9.0 watts

Dual Channel 15 watts

-with 2 SIMs installed 18 watts

Dual Channel

Ñwith auxiliary processor 24 watts

Ñwith 2 SIMs installed 27 watts

Supply Requirements Peak Current:

(Impulse) +5V

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-with 2 SIMs installed 3.6A

Dual Channel

-with auxiliary processor 4.7A

-with 2 SIMs installed 5.3A

No other VXI supplies used.

VXI System:

Uses 2M bytes of A24 or A32 space:

Module B or C size, single slot

Device Type Register Based (VXI Rev.1.3)

Logical Address 1-254, switch selectable

Interrupt Level 1-7, switch selectable

VME related A16/A32 or A16/A24, D16 Slave Device

Environmental:

Temperature:

Operating 0 ° C to 50 ° C

Non-Operating -40 ° C to 70 ° C

Humidity

<90% relative humidity, non-condensing

Airflow 1 L/sec. (100C rise) at .75 mm H2O

Mechanical:

Weight -(no SIMs installed)

C size B size

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Support:

PAC is committed to providing unsurpassed customer support. All hardware and software have a one year limited warranty. For a 90 day period, all software updates are free. Extended warranties are available for all products. Should the need arise for product repair, our goal is to have you back on-line within 48 hours for domestic companies, and 96 hours for international firms.

Ordering Guide

Model Number	Description
PAC-629C-X30/1B/R	Single ARINC 629 channel on a B-size module.
PAC-629C-X31/1B/R	Same as PAC-629C-X30/1B, plus time stamp and data logging FIFO.
PAC-629C-X32/1B/R	Same as PAC-629C-X31/1B, plus error injection capability.
PAC-629C-X30/1C/R	Single ARINC 629 channel on a C-size module.
PAC-629C-X31/1C/R	Same as PAC-629C-X30/1C, plus time stamp and data logging FIFO.
PAC-629C-X32/1C/R	Same as PAC-629C-X31/1C, plus error injection capability.
PAC-629C-X30/2C/R	Dual ARINC 629 channels on a C-size module.
PAC-629C-X31/2C/R	Same as PAC-629C-X30/2C, plus time stamp and data logging FIFO.
PAC-629C-X32/2C/R	Same as PAC-629C-X31/2C, plus error injection capability.

Options

PAC-629C-CPU	Auxiliary DSP Processor (Daughter card)
PAC-629A-SDC/1	SIM + DC-DC Converter (Single Channel)


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